Meeting: 1001, Evanston, Illinois, SS 10A, Special Session on Differential Geometry

1001-53-107 **Thomas A. Ivey*** (iveyt@cofc.edu), Dept. of Mathematics, College of Charleston, 66 George St., Charleston, SC 29424, and **Annalisa M. Calini**. *Closed, Knotted and Symmetric Solutions of the Vortex Filament Equation.* Preliminary report.

The vortex filament flow is an evolution equation for curves in three-dimensional space which is a geometric counterpart to the nonlinear Schrodinger equation (NLS). After reviewing the passage from a space curve γ to a potential $q(x,t)$ satisfying NLS (and vice-versa), I will discuss conditions on the spectrum of q that guarantee the closure of γ. (For finite-gap potentials, the simple points of the spectrum are the branch points of a hyperelliptic curve which, along with a choice of divisor, determines q.) I will report on our joint work, concerning the connection between this algebro-geometric data and the topology and geometry of γ. This is completely understood in genus one, where γ is the centerline of a Kirchhoff elastic rod. Moreover, we can use isoperiodic deformations to construct knotted solutions of higher genus, which suggests a scheme for labeling the knot type by the spectrum. I will also discuss the connection between symmetric spectra and the geometry of the filament in higher genus. (Received August 17, 2004)